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**RESPONSE ACTION PLAN
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, NEW CASTLE COUNTY, DELAWARE
EPA DOCKET NO III-95-55-DC**

Prepared For:

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AR304987

TABLE OF CONTENTS

	<u>Page No.</u>
1.0 INTRODUCTION	1
1.1 Site Description	2
1.2 Site History	2
1.3 Project Description	3
2.0 WORK PLAN ACTIVITIES/STRATEGY	4
2.1 Pre-field/Project Planning Activities	4
2.1.1 Preliminary Site Assessment	5
2.1.2 Sampling and Analysis Plan	8
2.1.3 Subcontractor Selection	9
2.2 Site Mobilization and Security	9
2.2.1 Site Mobilization	9
2.2.2 Site Security	10
2.2.3 Fire Protection	10
2.2.4 On-Site Property Access	10
2.2.5 Off-Site Property Access	11
2.2.6 Utilities	11
2.2.7 Schedule	11
2.3 Sampling and Analysis Report	12
2.4 Waste Classification and Processing of a Site USEPA Identification Number	12
2.5 Waste Remedial/Removal Options	12
2.5.1 Remedial Options	12
2.5.2 Treatability Study	13
2.6 Stormwater and Other Water Controls	14
2.7 Site Remedial Options and Risk Assessment	15
2.7.1 Site Remedial Options Assessment	15
2.7.2 Site Risk Assessment	16
2.7.3 Selection of Chemicals of Concern	17
2.7.4 Evaluation of Potential Groundwater Impacts	17
3.0 PROJECT REPORTING	18
4.0 PROJECT SCHEDULE	19
5.0 PROJECT ORGANIZATION AND RESPONSIBILITY	19
5.1 Project Organization	19
5.2 Field Organization	21

AR304988

TABLE OF CONTENTS--continued

LIST OF FIGURES

Figure 1 Site Location Map

LIST OF APPENDICES

Appendix A Field Sampling Plan
Appendix B Quality Assurance Project Plan
Appendix C Site Specific Health and Safety Plan
Appendix D Project Schedule
Appendix E Access Agreements
Appendix F Recent Photographs of Covered Soil Piles Generated During the USEPA Removal Action
Appendix G United Water Correspondence
Appendix H Risk Assessment
Appendix I Treatability Study

AR304989

ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing Materials
BCC	Brandywine Chemical Company
CAR	Corrective Action Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Lab Program
COCs	Chemicals of Concern
DI	Deionized
DNREC	Delaware Department of Natural Resources and Environmental Control
DQO	Data Quality Objectives
FSP	Field Sampling Plan
GC/MS	Gas Chromatograph/Mass Spectrometer
HASP	Health and Safety Plan
MSD	Matrix Spike Duplicate
MS	Matrix Spike
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NIST	National Institute of Standards and Technology
O ₂ LEL	Explosimeter - Oxygen Deficiency Meter
OSHA	Occupational Safety and Health Administration
OU-1	Operable Unit 1
OU-2	Operable Unit 2
OVA	Organic Vapor Analyzer
PID	Photionization Detector

AR304990

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PSA	Preliminary Site Assessment
QA/QC	Quality Assurance/Quality Control
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAP	Response Action Plan
RBCs	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPD	Relative Percent Difference
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SOPs	Standard Operating Procedures
SOQ	Statement of Qualifications
SOW	Statement of Work
TSWP	Treatability Study Work Plan
UCL	Upper Confidence Level
UPS	Uninterruptable Power System
USC	United States Coast Guard
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOCs	Volatile Organic Compounds

AR304991

**RESPONSE ACTION PLAN
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, NEW CASTLE COUNTY, DELAWARE**

1.0 INTRODUCTION

Pursuant to Section 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. 9606, delegated to the United States Environmental Protection Agency (USEPA) Administrator by Executive Order No. 12,580 (Order), and 52 Federal Regulation 2923 (January 29, 1987), Witco Corporation (Witco) was, by Order, USEPA Docket No. III-95-55-DC, signed 20 July 1995 and effective 25 July 1995 (the Order), ordered to perform removal activities at the Halby Chemical Superfund Site (Site) located in New Castle County, Delaware. Pursuant to the Order, Witco will implement response activities at the site as outlined below. Witco herein and after will be referred to as the Respondent as it applies to actions to this Order. The response activities will be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as amended by 40 CFR Part 300 and CERCLA. The objectives of the response activities will be to protect the public health and welfare and the environment by ensuring that a proper removal response action, as defined in Section 101 (23) of CERCLA, 42 U.S.C. 9601/231, is performed to abate, mitigate, and/or eliminate the release or threat of release of hazardous substances at the Site, investigate and isolate utilities from hazardous media, stabilize or otherwise treat highly contaminated soils and sludges, properly dispose of hazardous substances, as appropriate, and take measures to prevent migration of hazardous substances from the Site.

The following work plan is a Response Action Plan (RAP) to meet these objectives and satisfy the requirements of the Order. The work plan activities will be implemented by the Respondent according to the Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), and schedule as detailed in this RAP.

At this time, it is not possible to detail the necessary procedures required to fulfill all objectives of the Order for various reasons, including, but not limited to, the lack of information

AR304992

concerning the extent of Site contaminants, identification of suitable stabilization techniques and appropriate cleanup levels.

The RAP provides a schedule for expeditious performance of work plan activities and submittal of RAP supplements to USEPA for approval. RAP supplements will fully detail information concerning particular work plan activities for which adequate information does not yet exist.

1.1 Site Description

The Halby Chemical Site encompasses approximately 14 acres in Wilmington, New Castle County, Delaware (Figure 1). The Site is located in an industrial area near the Port of Wilmington on Terminal Avenue. Terminal Avenue borders the Site on the southwest; the Port is located to the east. The Site is also bounded by Interstate 495 (I-495) on the northwest and by a Conrail railroad track on the northeast. The Christina River is located approximately 2,000 feet to the northeast of the site.

1.2 Site History

The Halby Chemical site was operated by Halby Chemical Company from 1948 to 1977 as a chemical production facility. The company's three principal products were ammonium thiocyanate, ammonium thioglycolate and isooctyl thioglycolate. A portion of the site was used by the Pyrites Company until 1969 to store pyrite ore for the production of sulfuric acid. In 1972, Halby Chemical Company merged with Argus Chemical Company, a wholly-owned subsidiary of the Witco Corporation. Chemical production activities continued at the site under Witco ownership until the plant closed in 1977. Brandywine Chemical Company, the most recent owner, purchased the property from Witco in 1977.

Brandywine Chemical Company operated the site as a bulk chemical receiving and distribution facility until 1995, when operations were terminated by EPA. During Brandywine's operations, bulk chemicals were shipped to the site via rail or trucks and stored outside in aboveground storage tanks. The chemicals were later repackaged into empty drums and stored either in the warehouse building or outside within the fenced area.

AR304993

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From 1948 to 1964, cooling water, surface water runoff and acid wastewater from the Halby facility were discharged into the drainage ditch located along the northeast border of the process plant area. Liquids from the drainage ditch flowed into an on-site unlined lagoon. The lagoon periodically drained through a tidal marsh southeast of the site into the Lobdell Canal and subsequently into the Christina River. From 1964 to 1972, the acid wastewater was discharged to the county sewer system and only cooling water entered the lagoon. By 1975, Witco was periodically diverting the wastewater flow from the county sewer system to a pilot wastewater treatment plant. The treated wastewater was discharged to the lagoon. Production operations at the site ceased in August 1977, after which the site served as a receiving and distribution facility. At some time between May 1977 and June 1983, the northeast bank of the lagoon was breached permitting the lagoon to drain through the drainage ditch along I-495 to the Christina River.

There are two operable units at the Halby Chemical Site. Operable Unit 1 (OU-1) was identified as the soil in the former process plant area. Operable Unit 2 (OU-2) was identified as all groundwater at the site; along with soil, surface water, and sediment which are outside the limits of OU-1.

During the Removal Action performed by the USEPA beginning 3 February 1995 and ending 1 August 1995, some of the soil and sediments associated with the Site's drainage system, which includes a sump, discharge pipes, a ditch, and a former lagoon, were found to be contaminated with hazardous substances that exhibited Resource Conservation and Recovery Act (RCRA) hazardous characteristics of ignitability, sulfide reactivity, and/or corrosivity.

1.3 Project Description

Based on the preliminary data, the respondent has determined that the most effective and appropriate approach to comply with the Order is to perform the response action in the area of the site's drainage system. The focus of this RAP is the site's drainage system and includes activities required to satisfy the Order. The site's drainage system includes: the former sump, sump overflow area, and drainage ditch.

AR304994

2.0 WORK PLAN ACTIVITIES/STRATEGY

In accordance with Section VIII "Response Action Plan Development And Implementation" of the Order, the Respondent shall address and accomplish the following items:

- a. Provide Site security;
- b. Provide fire protection;
- c. Control stormwater and other water;
- d. Minimize fugitive emissions;
- e. Isolate water main, utilities, and services;
- f. Perform a treatability study;
- g. Evaluate soil cleanup levels;
- h. Stabilize contaminated soils, sediments, and sludges;
- i. Provide for proper disposal of materials which cannot be remediated in-situ;
- j. Conduct post excavation and/or treatment sampling;
- k. Provide Site-Specific Health and Safety Plan (HASP);
- l. Obtain a Hazardous Waste Generator Identification Number;
- m. Minimize exposure of aquatic species;
- n. Provide schedule;
- o. Backfill excavated areas; and
- p. Provide post-removal maintenance.

Items h, i, and j will be addressed as additional information becomes available. The requirements of the Order also include, preventing the migration of hazardous substances, implementation of the HASP and providing an expeditious schedule.

2.1 Pre-field/Project Planning Activities

Pre-field/project planning activities consisted of preparation of a Preliminary Site Assessment (PSA) and Sampling and Analysis Plan (SAP). In addition, pre-field/project planning included development of a HASP and selection of subcontractors.

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2.1.1 Preliminary Site Assessment

A PSA was performed to study and evaluate all historical data associated with the Site. This was accomplished through a combination of on-site reconnaissance, interviews with persons knowledgeable of former or current activities at the site, and compilation and review of available data relative to the site and/or facility. In order to investigate the Site, a visual ground reconnaissance of the Site, adjacent areas, and potentially affected areas was performed. The purpose of the PSA was to focus the response action by avoiding duplication of previous efforts and enhancing the efficiency of future work. The review of data assisted in describing hazardous waste sources, migration pathways, and human and environmental receptors.

Available pertinent data for the Site was obtained and evaluated. These data included, but are not necessarily limited to, the following:

- RI report for OU-2 (FS report for OU-2 was not obtained).
- RI/FS report for OU-1.
- Record of Decision (ROD) for OU-1.
- All available documentation from Brandywine Chemical Company (BCC).
- Results from USEPA Removal Action including test pit analyses and treatability studies.
- Past and present ownership/occupancy of the Site.
- Types and sources of materials and substances stored on-site, including estimated volumes, dates, purposes, handling, and disposal.

AR304996

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- Records of past spills, leaks, releases, or discharge of hazardous substances, including any remedial or removal actions taken; locations of waste materials on-site; waste haulers; and waste generators (EPA records of 1995 removal action were not obtained).
- Manufacturing processes of the waste generator(s).
- Records of any notices of violation, corrective action orders, or other regulatory actions which may have been initiated against the Site.
- Reports, logs, and records of geologic, hydrogeologic, geophysical, soils, or foundation studies which were completed for the Site and/or region. This information was used to better define the hydrogeologic framework beneath and downgradient from the Site.
- Any previous analyses of groundwater samples from drinking water or monitoring wells located on or near the Site.
- Any previous analyses of samples of surface water, soils, and sediment.
- Current and historic aerial photography and mapping of the Site, including topographic, site structure and building plans, and utilities mapping. Analysis of available historical aerial photography was used to assess relative dates of Site and surrounding area development.
- Zoning maps for the Site.
- Boundary survey maps for the Site.
- Utility and railroad information such as drawings and foundations.

Sources of these data included: USEPA, United States Soil Conservation Service, United States Geological Survey, Delaware Geological Survey, County Emergency Management Agencies, BCC, Wilmington town officials, utility

AR304997

companies, Delaware Department of Natural Resources and Environmental Control (DNREC), past and present property owners or tenants and their employers, and adjoining property owners.

A site reconnaissance was completed to evaluate site conditions. The following tasks were done.

- Property lines were added to the existing topographic map from previous surveys and available tax map information.
- Maps were prepared to better define areas of contaminants.
- Presence and condition of physical hazards were evaluated.
- Presence of and access to soil, surface water, and groundwater sampling points were reviewed.
- Potential safety risks to on-site personnel were identified.
- Interviews with past and present employees, owners, and occupants, as well as research of any pertinent records which were available, was conducted to determine sources and types of contaminants.

Based on the PSA, the following was prepared:

- Narrative description of Site location and location identification on USGS topographic quadrangle map.
- Description of past and present Site uses and operations conducted at the Site, including Site size, physical layout of buildings, Site features, and utilities; and handling, storage, and disposal of hazardous substances or wastes.

AR304998

- Possible types and characteristics of hazardous substances or wastes stored at the site and description of any containers, landfills, waste piles, ponds, lagoons, and physical hazards which may be present.
- Description, location, availability, and copies of all pertinent current and historic maps, plans, and photographs (including historic aerial photographs) of the Site.
- Summary maps and interpretation of all available data from historical sampling events of groundwater, surface water, and soil.
- Summary and interpretation of any known past spills, leaks, releases, or discharges of hazardous substances or wastes, including reports of any known remedial action taken.
- Conclusions on the possible extent of contamination from current data and the potential for migration from the Site.

2.1.2 Sampling and Analysis Plan

The Sampling and Analysis Plan consists of a Field Sampling Plan (FSP) (Appendix A) and Quality Assurance Project Plan (QAPP) (Appendix B). The FSP provides guidance for fieldwork in the area of the water main, drainage ditch, and sump area. The FSP includes the following:

- Sampling objectives
- Drawings showing proposed sampling locations and tables indicating frequency of sampling.
- Analytical parameters to be tested for.
- Sampling designation and procedures to be employed.

The QAPP describes the policies, organization, and quality assurance and quality control protocols necessary to achieve Data Quality Objectives (DQOs) dictated by the intended use of the data.

2.1.3 Subcontractor Selection

Subcontractors have been interviewed and their qualifications evaluated prior to selection and EPA acceptance to work on this project. Envirotech Research, Inc. of Edison, New Jersey, has been selected by Witco and accepted by USEPA for laboratory services. Republic Environmental Systems, Inc. of Bordentown, New Jersey was selected by Witco and accepted by USEPA to perform test pit excavation near the water line and install the security fence. The selected subcontractors are fully qualified and meet all applicable requirements including Occupational Safety and Health Administration (OSHA) requirements. USEPA and DNREC have been notified in writing of the identity of all subcontractors, in accordance with the Order. Additional subcontractors will be selected and evaluated prior to submission to USEPA for its acceptance during the course of the project.

2.2 Site Mobilization and Security

A comprehensive HASP (Appendix C) has been developed which establishes the health and safety zones (exclusion zones, decontamination zones, and support zones) and health and safety procedures for planned activities.

2.2.1 Site Mobilization

A field office has been established at the Site by setting up a temporary portable trailer. In addition to acting as a field office, the trailer will be used to store analytical equipment, laboratory glassware, supplies, and health and safety equipment. A portable toilet is available for use during the field activities.

2.2.2 Site Security

Temporary fencing has been constructed around the drainage ditch and appropriate hazard warning flagging and placards have been posted. Additional fencing will be constructed between the lagoon and railroad tracks. The extent of fencing is shown on Drawing No. 3, Existing and Proposed Fence Location. This drawing is provided in the Field Sampling Plan.

2.2.3 Fire Protection

Fire protection appropriate to Site conditions will be provided to protect public health and welfare. Fire protection will be provided by the selected subcontractor and includes a water fog and fire extinguishers. Local fire authorities will be advised of implementation of work and of fire protection procedures.

2.2.4 On-Site Property Access

Approval to access the Halby Chemical Site located in Wilmington, New Castle County, Delaware has been received from the property owners. Ms. Valeria Hahn of the BCC is the current owner and operator of OU-1 of the Halby Chemical Site property. A Settlement Agreement and Mutual Release has been signed between Witco and Brandywine allowing access.

Upon receipt of USEPA's approval of the RAP, a letter will be sent to Ms. Hahn notifying her of the respondents intentions to implement the RAP, along with a copy of the approved RAP. Ms. Hahn was sent a copy of the 1 September 1995 RAP previously.

Access to Site property owned by F&H Transport was also received and a copy is included in Appendix E.

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Access agreements include access to the Site for the following personnel: USEPA, DNREC, Respondent, Contractors, Subcontractors, Utility Company Representatives, and local or county Fire Officials.

An access road located along Terminal Avenue will be used during the field investigation to access all on-site sampling points.

Construction of new roads or improvements to existing vehicle access roads is not anticipated during the field investigation.

2.2.5 Off-Site Property Access

Additional property owners who are effected by the response action have been identified and access obtained. Access to property located in the response action area owned by Conrail has been received. United Water and Delmarva Power have also been contacted for access. Copies of the access agreements with Conrail is included in Appendix E.

2.2.6 Utilities

Delaware Utility Markout Service was contacted for a full underground utility markup for the fenced drainage ditch area (Ticket Number 375-028). Contacts have been made with utility companies including, but not limited to, United Water, Conrail, and Delmarva Power to provide utility markouts, obtain drawings showing locations, design diagrams (foundations), and any protocols to be followed during excavation and/or remediation near the utilities. In addition, utility companies have been notified of identified Site contaminants which impact the respective utilities. Copies of correspondence with United Water is included in Appendix G.

Contacts were made to research the use of two pipes, previously uncovered by USEPA during the removal action in the sump outfall area.

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2.2.7 Schedule

The projected schedule (Appendix D) will include the estimated times of initiation and completion of the tasks associated with access approvals and the submittal of all deliverables.

2.3 Sampling and Analysis Report

A report will be prepared to incorporate all analytical results, sampling locations, and conclusions from the Field Sampling Investigation.

2.4 Waste Classification and Processing of a Site USEPA Identification Number

The respondent will use the information gathered during the field investigation to classify the wastes.

The respondent will obtain a USEPA hazardous waste identification number for the Site. This will be performed by preparing a Notification of Regulated Waste Activity Form (No. 8700-12) and submitting the completed form to the appropriate regulatory agency office. The respondent will be responsible for signing and certifying this document.

2.5 Waste Remedial/Removal Options

The results of the detailed waste characterization and classification activities will be evaluated to address remedial and/or removal options. The respondent will evaluate the most environmentally sound and cost-effective remedial options which may be available for the handling of these wastes. The disposition of the soil/sediments will be determined based upon the result of all screening and laboratory analytical data, waste classification, and final remedial options assessment. Various remedial options will be evaluated as described below.

AR305003

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2.5.1 Remedial Options

Several remedial options exist for the handling of these materials including, but not limited to, the following:

- No action for materials below the action levels to be developed pursuant to the Order;
- Waste segregation for disposal of portions of the waste as nonhazardous wastes, in addition to hazardous waste in accordance with the results of the waste characterization;
- On-site stabilization and off-site disposal of the waste into a hazardous or non-hazardous waste landfill as appropriate;
- Off-site treatment and disposal;
- In-situ treatment;
- On-site stabilization and reuse on-site;
- On-site stabilization, off-site disposal of high concentrations of metal-contaminated soils; and capping on-site of lower levels of metal contaminated soil; and
- On-site containment.

Off-site disposal into a landfill will be compared with other remedial methodologies which may be available. The feasibility of other possible treatment methods or combinations of methods will be evaluated with respect to the range in waste volumes and characteristics, site operating conditions and constraints, cost and time requirements, reliability, implementability, and resultant long-term liability. These options or technologies which are

AR305004

protective and cost-effective and can achieve site goals, in accordance with all applicable local, state, and federal regulations, will be identified.

2.5.2 Treatability Study

A Treatability Study Work Plan (TSWP) will be prepared to determine the suitability of any proposed options. The TSWP will describe the physical characterization tests to delineate the soil characteristics that may influence treatment effectiveness. Preliminary Treatability Study information is included in Appendix I.

The Site soils and sediments are contaminated by a complex mixture of Volatile Organic Compounds (VOCs) (including carbon disulfide), semivolatiles (including pyrene, benzo (a) pyrene, phenanthrene, fluorene, chrysene, fluoranthene, and acenaphthene), and inorganic compounds (ammonium thiocyanate, arsenic, beryllium, chromium, copper, cobalt, lead, manganese, mercury, vanadium, and zinc) at widely varying concentrations.

Because of this mixture of constituents, there are no readily accepted methods. Therefore, the TSWP will need to evaluate a variety of options and/or combinations.

2.6 Stormwater and Other Water Controls

The Respondent will implement stormwater and other water controls at the Site. The need for stormwater and other water control is based upon the following rationale:

- Surface water does contribute to migration of contamination;
- Surface water may hinder stabilization or removal of hazardous substances and pollutants from the Site drainage system;
- The required response action will alter drainage patterns at, and adjacent to the Site; and

AR305005

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- The impacts of altered drainage patterns, erosion, and sedimentation must be assessed and mitigated.

Stormwater controls consisting of berms and ditches will be initiated approximately one week after mobilization. This stormwater control will divert surface flow from approximately 2.5 acres of land, away from the drainage ditch within the fenced area, into the lagoon downstream of the current fenced area.

The existing drainage ditch within the fenced area will remain. The temporary water control for the existing drainage ditch (berm) constructed by EPA will be covered with high density polyethylene (HDPE) and additional soil to provide a more substantial surface water control. The surface water collected within this area will be allowed to evaporate and/or seep into the ground.

We will construct a dike at the upper end of the lagoon at the breached area along I-495 at elevation +4 to minimize tidal flow onto and from the site.

These short term storm/surface water control actions will be modified upon implementation of the removal/remedial action.

2.7 Site Remedial Options and Risk Assessment

Based on the results of the extent of contamination and treatability studies, a detailed site remedial option analysis and risk assessment analysis will be performed. The purpose of these evaluations will be to identify the most appropriate technologies for addressing any soil contamination determined to be present and to establish target site cleanup goals to be attained by the selected technology. Preliminary Risk Assessment information is included in Appendix H. The results of these assessments will be used as a major component in the development of the final RAP. The procedures for completion of the site remedial options and risk assessment are provided in Sections 2.7.1 and 2.7.2 below.

AR305006

2.7.1 Site Remedial Options Assessment

A remedial options assessment for contaminated soil determined to be present on the Site will be performed based on a review of historical sampling results, including the most recent sampling conducted by USEPA and the results of the proposed delineation sampling and proposed treatability studies. The remedial options assessment will address chemicals of concern (COC) identified as discussed in Section 2.7.3 below. The preliminary list of potential remedial options for contaminated soils are described in Section 2.5 of this RAP. This list may be modified based on the results of the RAP.

The identified potential remedial methods, or combinations of methods, will be compared in consideration of Site conditions and constraints, costs, time requirements, achievable treatment levels, implementability, and resultant long-term liability. Those options or technologies which are protective and cost-effective will be identified and evaluated in the final RAP.

2.7.2 Site Risk Assessment

A baseline human health risk assessment was previously performed and documented in the revised Remedial Investigation Report (RI) prepared by CH₂M Hill dated March 1995 and submitted for OU-2. The assessment incorporated data collected in 1993 and 1994 with earlier public-health evaluations and identified environmental media and chemical constituents likely to contribute to elevated risks to potential receptors under the current industrial site-use (worker and trespassers) and the future residential site-use scenario (child and adult resident and construction workers).

An ecological risk assessment was also performed as part of the RI for OU-2 to determine chemicals of concern (COCs) representing a hazard to ecological resources.

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A "Review of Constituent of Concern Toxicity" report (ERM, November 1995) was submitted to EPA. This report developed screening Risk-Based Concentrations (RBCs) for the primary COCs.

Risk assessment data as reported in the RI for OU-2 will be supplemented with risk assessment data from the RAP as applicable to evaluate cleanup levels. Applicable RBCs will be developed based on all available data including anticipated future-use. In addition to health based and ecological criteria determined for surficial soils and exposed subsurface soils for ingestion and inhalation pathways, soil analytical results will be evaluated to determine potential groundwater impacts, as discussed in Section 2.7.4 below.

Cleanup levels based on health and ecological based criteria, impact to groundwater criteria, and/or background conditions may be modified, if the selected remedial option includes capping, solidification, or containment of soil contaminants. The modified criteria would reflect the minimal health based risks associated with ingestion and inhalation if these remedial options were implemented, as well as address migration to groundwater impacts.

2.7.3 Selection of Chemicals of Concern

An identification of all COCs will be based on previous sampling data, a review of the recent USEPA sampling in the sump and drainage ditch areas, and sample results obtained during the delineation sampling. At present, carbon disulfide, arsenic, and reactive sulfide are specified in the Order. Carbon disulfide, arsenic, manganese, and thiocyanate were evaluated in the ERM report for removal purposes. Additional COCs will be included in the work proposed herein.

For identified COCs, indicator scores or risk values will be computed for each contaminant chemical based on a 95% Upper Confidence Level (UCL) and compared to the Region III RBCs or developed risk levels.

AR305008

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The hazard identification will be presented in the form of tables which lists the chemicals detected and of concern in each medium; basic physical, chemical, and toxicity data for that chemical; their frequency of detection; the range of concentrations (minimum, mean, and maximum); the range of quantitation limits; relevant background levels; the indicator scores and relative risk factors; and the Applicable or Relevant and Appropriate Requirements (ARARs), where applicable.

2.7.4 Evaluation of Potential Groundwater Impacts

Calculation of acceptable soil concentrations for remedial options, including excavation or insitu treatment, will be based on health and ecological risks and potential impact to groundwater. For remedial options including capping, stabilization, and containment, calculation of cleanup levels will be based primarily on impact to groundwater criteria.

Hydrologic and hydrogeologic modeling will be performed to determine acceptable soil contaminant concentrations. A soil attenuation model that considers constituent migration in the unsaturated zone and dilution in the saturated zone, will be used to determine the effects of contaminant dispersion in the groundwater.

3.0 PROJECT REPORTING

During the performance of this work, a number of both progress (every 15 days) and RAP supplements are required. Hard copies and original paperwork will be stored in the Contractor's central file storage area. Reduced data will be stored in electronic spreadsheets. Reports prepared and submitted as part of this project will include the following:

- Progress reports will include:

1. A description of the work completed and the actions that have been taken toward achieving compliance with the Order, including measures to prevent pollution.

AR305009

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2. A description of all data anticipated and activities scheduled for the upcoming progress period.
 3. A description of any problems encountered or anticipated.
 4. Any actions taken to prevent or mitigate such problems.
 5. A schedule for when such actions will be completed.
 6. Copies of all analytical data received during the progress period.
 7. All modifications to the RAP and schedule as formally approved during the reporting period.
- A comprehensive final draft on the extent of its activities, its results, and its subsequent conclusions will be prepared as the final product of the project. The final report will include raw data, synthesized data in charts and graphs, as appropriate, in support of all interpretations of findings. Site maps will be provided to illustrate the data. Copies of all hazardous waste manifests will be included in the final report.

4.0 PROJECT SCHEDULE

The schedule for the RAP and work plan activities associated with the Halby Chemical Site is included in Appendix D. This project schedule includes the estimated times of initiation and completion of the tasks associated with the work plan activities and the submittal of all deliverables.

5.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Witco Corporation will be responsible for the implementation of the RAP. Witco has selected various contractors and subcontractors as detailed below. A detailed project organization is included in Section 2.0 and Figure 1 of the QAPP.

AR305010

5.1 Project Organization

The primary personnel involved in the project, their addresses, telephone numbers, and facsimile numbers are listed below.

Regulatory Agencies

U.S. Environmental Protection Agency
DE/MD Remedial Section (3HW42)
841 Chestnut Building
Philadelphia, Pennsylvania 19107
Mr. Eric Newman - Remedial Project Manager
(215) 597-0910
FAX (215) 597-9890

Delaware Department of Natural Resources and Environmental Control
715 Grantham Lane
New Castle, Delaware 19720
Ms. Jane Biggs-Sanger - Project Manager
(302) 323-4540
FAX (302) 323-4561

USEPA Contractor

CH2M Hill
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Other subcontractors will be chosen as the project progresses.

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5.2 Field Organization

Field investigations and activities will be conducted according to the programs and schedules presented in the RAP. The sampling team members will consist of the Site Safety Officer, Field Operations Leader, and sampling team.

Field personnel will be responsible for sample collection, chain-of-custody documentation, and sample shipment. The field operations leader will be responsible for all sampling efforts and for assuring that the necessary shipping and packing materials and sampling equipment are available. The field operations leader will also be responsible for completing sampling documentation including daily logs, calibration logs, and chain-of-custody forms. All documentation will conform to the guidelines contained within the QAPP. Sample bottles, preservatives, and shipping coolers will be provided by the laboratory.

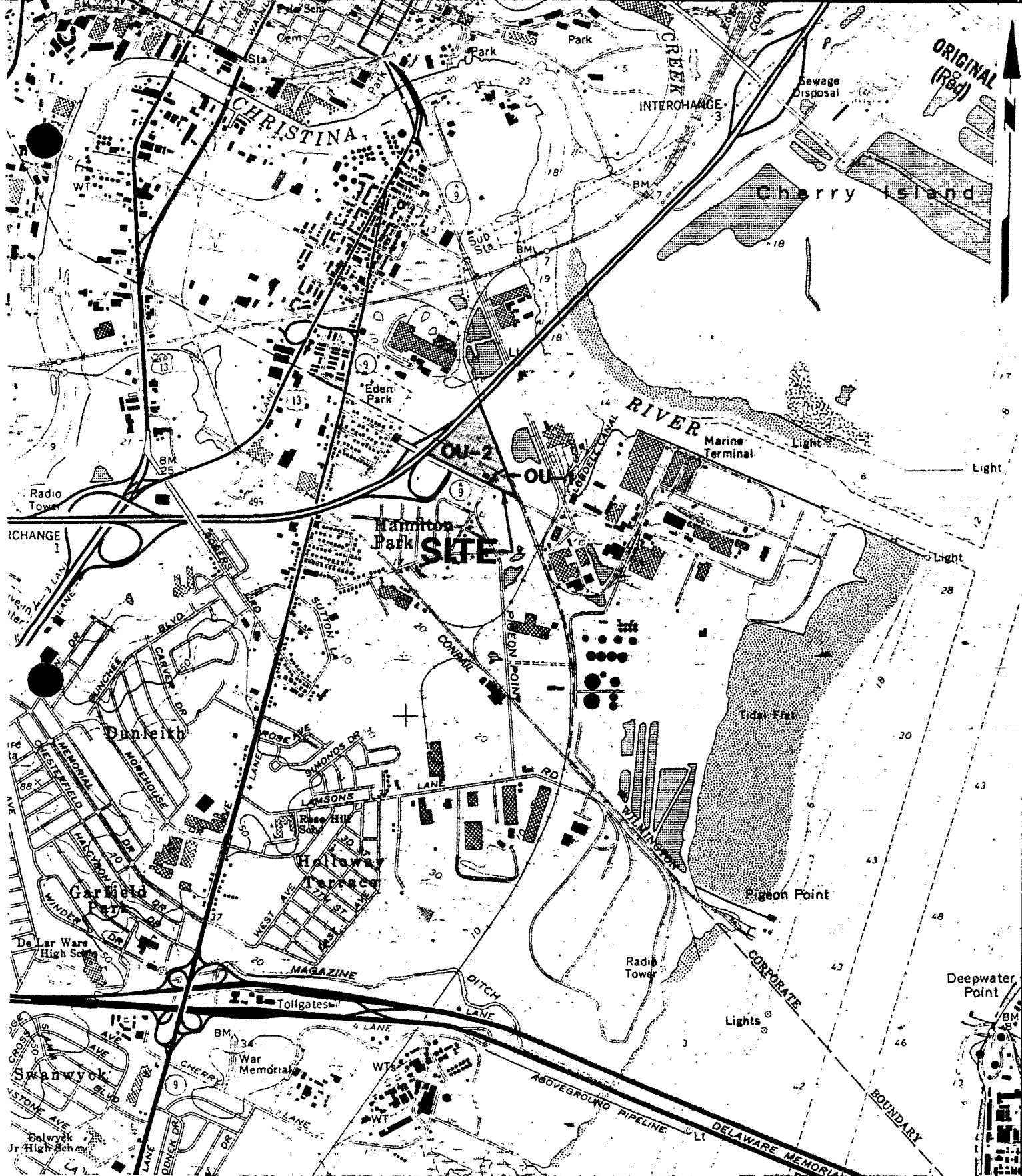
The field operations leader and sampling team will be responsible for the collection of QA samples during the field investigation. Adherence to these procedures will facilitate the collection of high quality data and increase data usability. If the guidelines described in this plan require modifications due to site conditions, changes to the work plan, or any other reasons, the QA Manager will be notified, and the changes will be documented and implemented.

The Site Safety Officer will be responsible for assuring that all team members adhere to the site health and safety requirements. Additional responsibilities are detailed in the Health and Safety Plan. The Site Safety Officer will also complete the Field Audit Form during the sampling investigation.

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FIGURES

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WILMINGTON SOUTH, DEL.-N.J. U.S.G.S. QUADRANGLE MAP, 1987

OU-1 OPERABLE UNIT 1
OU-2 OPERABLE UNIT 2

L **Langan**
Engineering and Environmental Services, Inc.

HALBY CHEMICAL SITE
SITE LOCATION MAP

ELMWOOD PARK NJ • NEW YORK NY • MIAMI FL • WEST PALM BEACH, FL • DOYLESTOWN PA

WILMINGTON

DELAWARE

PROJ 2061601

SCALE 1"=2000' DATE 05/95 FIG NO

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APPENDIX A

FIELD SAMPLING PLAN

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**FIELD SAMPLING PLAN
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, NEW CASTLE COUNTY, DELAWARE
EPA DOCKET NO III-95-55-DC**

Prepared For:

Witco Corporation
One American Lane
Greenwich, Connecticut 06831

Prepared By:

Langan Engineering and Environmental Services, Inc.
River Drive Center 1
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2061601
1 September 1995
20 November 1995 Revised

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TABLE OF CONTENTS

	<u>Page No.</u>
1.0 INTRODUCTION	1
1.1 Purpose and Sampling Objectives	1
1.2 Site Description	1
1.3 Site History	2
1.4 Sampling Objectives	3
2.0 SCOPE OF WORK	4
2.1 Investigation of Water Main - First Event	4
2.1.1 Sample Location and Frequency	4
2.1.2 Sample Analysis	4
2.2 Investigation of Water Main - Second Event	5
2.2.1 Sample Location and Frequency	5
2.2.2 Sample Analyses	6
2.3 Drainage Ditch Delineation	6
2.3.1 Sample Location and Frequency	6
2.3.2 Sample Analysis	7
2.4 Sump Area Delineation	7
2.4.1 Sample Location and Frequency	7
2.4.2 Sample Analysis	8
2.5 Site Security and Fire Protection	8
3.0 FIELD SAMPLING PROCEDURES	9
3.1 Test Pits	9
3.2 Handling of Excavated Materials	10
3.3 Sampling Procedures	10
3.3.1 Soil Sampling Procedures	10
3.3.2 Groundwater Sampling Procedures	10
3.3.3 General Procedures	11
3.4 Field Quality Control Samples	11
3.5 Sample Labeling Procedures	13
3.6 Sampling Containers, Preservation, and Holding Times	14
3.7 Packaging and Shipping	15
3.8 Chain of Custody Record Procedures	15
3.9 Field Logbook Procedures	17
3.10 Decontamination Procedures	18
3.11 Waste Handling Procedures	19

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TABLE OF CONTENTS--continued

LIST OF TABLES

Table 1	Analytical Parameters and Methodology Summary - Water Main Investigation - First Event
Table 2	Analytical Parameters and Methodology Summary - Drainage Ditch Delineation
Table 3	Analytical Parameters and Methodology Summary - Sump Area Delineation
Table 4	Analytical Parameters and Methodology Summary - Water Main Investigation - Second Event
Table 5	Parameters, Sample Containers, Sample Volumes, Preservation and Holding Times

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Log of Test Pit
Figure 3	Sample Container Label
Figure 4	Custody Seal
Figure 5	Chain-of-Custody

LIST OF DRAWINGS

Drawing 1	Topographic Map
Drawing 2	Existing and Proposed Sampling Locations
Drawing 3	Existing and Proposed Fence Location

LIST OF ATTACHMENTS

Attachment A	Field Audit Checklist
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ACRONYMS

ASTM	American Society for Testing Materials
CGI	Combustible Gas Indicator
CLP	Contract Lab Program
COCR	Chain of Custody Record
DQO	Data Quality Objectives
FSP	Field Sampling Plan
HASP	Health and Safety Plan
MS	Matrix Spike
MSD	Matrix Spike Duplicate
OU-1	Operable Unit 1
OU-2	Operable Unit 2
PID	Photoionization Detector
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SOP	Standard Operating Procedures
SOW	Statement of Work
USEPA	United States Environmental Protection Agency

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ABBREVIATIONS

ppm

Parts Per Million

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**FIELD SAMPLING PLAN
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, NEW CASTLE COUNTY, DELAWARE**

1.0 INTRODUCTION

1.1 Purpose and Sampling Objectives

This Field Sampling Plan (FSP) has been prepared by Langan Engineering and Environmental Services, Inc. (Langan) to describe the sampling procedures for the proposed investigations to be undertaken to supplement the existing analytical information and to identify and evaluate remedial alternatives. This document serves to provide guidance for field work by defining the methods to be used for the collection and analysis of environmental samples for the water main investigation, drainage ditch delineation, and sump area delineation.

The FSP was prepared to:

- document specific sampling objectives, procedures, and rationales for field work and sample analytical work;
- provide a mechanism for planning and approving site and laboratory activities;
- ensure that sampling and analysis activities are necessary and sufficient; and,
- provide a common point of reference for all parties to ensure the comparability and compatibility of all objectives of sampling and analysis activities.

1.2 Site Description

The Halby Chemical Site encompasses approximately 14 acres in Wilmington, New Castle County, Delaware (Figure 1). The Site is located in an industrial area near the Port of Wilmington on Terminal Avenue. Terminal Avenue borders the Site on the southwest; the Port is located to the east. The Site is also bounded by Interstate 495

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(I-495) on the northwest and by a Conrail railroad track on the northeast. The Christina River is located approximately 2,000 feet to the northeast of the site. The site topography is shown on Drawing 1.

1.3 Site History

The Halby Chemical site was operated by Halby Chemical Company from 1948 to 1977 as a chemical production facility. The company's three principal products were ammonium thiocyanate, ammonium thioglycolate and isooctyl thioglycolate. A portion of the site was used by the Pyrites Company until 1969 to store pyrite ore for the production of sulfuric acid. In 1972, Halby Chemical Company merged with Argus Chemical Company, a wholly-owned subsidiary of the Witco Corporation. Chemical production activities continued at the site under Witco ownership until the plant closed in 1977. Brandywine Chemical Company, the most recent owner, purchased the property from Witco in 1977.

Brandywine Chemical Company operated the site as a bulk chemical receiving and distribution facility until 1995, when operations were terminated by EPA. During Brandywine's operations, bulk chemicals were shipped to the site via rail or trucks and stored outside in aboveground storage tanks. The chemicals were later repackaged into empty drums and stored either in the warehouse building or outside within the fenced area.

From 1948 to 1964, cooling water, surface water runoff and acid wastewater from the Halby facility were discharged into the drainage ditch located along the northeast border of the process plant area. Liquids from the drainage ditch flowed into an on-site unlined lagoon. The lagoon periodically drained through a tidal marsh southeast of the site into the Lobdell Canal and subsequently into the Christina River. From 1964 to 1972, the acid wastewater was discharged to the county sewer system and only cooling water entered the lagoon. By 1975, Witco was periodically diverting the wastewater flow from the county sewer system to a pilot wastewater treatment plant. The treated wastewater was discharged to the lagoon. Production operations at the site ceased in August 1977, after which the site served as a receiving and distribution

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facility. At some time between May 1977 and June 1983, the northeast bank of the lagoon was breached permitting the lagoon to drain through the drainage ditch along I-495 to the Christina River.

There are two operable units at the Halby Chemical Site. Operable Unit 1 (OU-1) was identified as the soil in the former process plant area. Operable Unit 2 (OU-2) was identified as all groundwater at the site; along with soil, surface water, and sediment which are outside the limits of OU-1.

During the Removal Action performed by the United States Environmental Protection Agency (USEPA) beginning 3 February 1995 and ending 1 August 1995, some of the soil and sediments associated with the Site's drainage system, which includes a sump, discharge pipes, a ditch, and a former lagoon, were found to be contaminated with hazardous substances that exhibited Resource Conservation and Recovery Act (RCRA) hazardous characteristics of ignitability, sulfide reactivity, and/or corrosivity.

1.4 Sampling Objectives

The sampling objectives are to supplement the existing data and to identify and evaluate remedial alternatives for the site. Witco believes that sufficient data exists to fully delineate the site contaminants at present; however, the proposed field investigation is needed to further define the "clean" areas, assist in the development of action levels, and evaluate the condition of the water main. Witco may propose additional field investigations to further identify the vertical and horizontal extent of contamination. Additional field investigations may consist of test borings.

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2.0 SCOPE OF WORK

2.1 Investigation of Water Main - First Event

2.1.1 Sample Location and Frequency

The objective of the first soil sampling event in the area of the water main was to evaluate the presence, extent, and degree of soil contamination particularly carbon disulfide. The soil sampling locations were approximately two feet west of the pipe and then every 50 feet along the 350 foot length of the water main which parallels the drainage ditch. A total of six locations were sampled.

To evaluate the extent of soil contamination, 12 soil samples were collected, two samples per test pit. Test pits were excavated to a maximum depth of seven feet and were oriented parallel to the west edge of the water main. The width of each test pit was two feet (width of backhoe bucket). The excavations were extended to within two feet of the water main in order to minimize potential damage to the protective coating.

Soil samples were collected from the base of the test pit, and from the location above the water table with the highest Photoionization Detector (PID) field measurement or carbon disulfide dräger tube concentration. In all cases this sample was also located above the water main. The presence of contamination was evaluated by the PID field measurement, dräger tube concentration or visual observation. Test pit locations (TP-1 to TP-6) are shown on Drawing 2.

2.1.2 Sample Analysis

The analytical parameters and methodology for the water main investigation first event is included in Table 1.

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2.2 Investigation of Water Main - Second Event

2.2.1 Sample Location and Frequency

The objective of the second sampling event in the area of the water main is to evaluate the presence, extent, and degree of contamination particularly carbon disulfide. In addition, the condition of the water main will be evaluated for the potential of corrosive soils and/or stray currents which could adversely impact the water main. The soil sampling locations (TP-28 through TP-33) will be located along the water main.

Two of the locations (TP-30 and TP-31) will be used to expose the water main in order to evaluate the condition of the pipe (Drawing 2). A NACE-certified Engineer/Specialist of RAM Services of Bellvale, New York, will perform soil resistivity testing, stray current analysis, and electrical continuity.

Four of the locations will be excavated to a maximum depth of seven feet along the water main as shown on Drawing 2.

Soil samples will be collected from all six test pit locations referenced above (2 to 3 samples per test pit) as follows:

- One soil sample will be collected from an interval at the base of the water main.
- One soil sample will be collected from an interval above the water main if contamination is suspected by PID field measurement, carbon disulfide dräger tube concentration or where visual observation indicates contamination.
- An additional soil sample will be collected, if deemed necessary, from an interval having the greatest PID field measurement, carbon disulfide

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dräger tube concentration or where visual observation indicates contamination.

A groundwater sample will also be collected from a selected test pit located along the water main. The sample will be selected from the test pit having a high reading on the PID carbon disulfide dräger tube concentration or where visual observation (sheen or floating product) indicates contamination.

2.2.2 Sample Analyses

The analytical parameters and methodology for the water main investigation - second event is included in Table 2.

2.3 Drainage Ditch Delineation

2.3.1 Sample Location and Frequency

The objective of the soil sampling in the area of the drainage ditch is to supplement the existing data and to identify and evaluate remedial alternatives for the site. Soil sampling will be performed to evaluate the vertical and horizontal extent of contamination within the ditch and the area bounded by the temporary site security fence. The soil sampling locations will be located within a 25 foot radius of previous sampling locations exceeding 10 parts per million (ppm). A total of 17 locations will be sampled (Drawing 2).

Test pits (TP-9, TP-15, TP-20, and TP-22) will be excavated perpendicular to the drainage ditch due to accessibility.

Test pits will be excavated to a maximum depth of seven feet or deeper, if warranted and test pit sidewalls are stable. The width of each test pit will be two feet (width of backhoe bucket).

Soil samples will be collected from all 17 test pit locations (TP-7 through TP-23) (1 to 2 samples per test pit) as follows:

- At least one soil sample will be collected from the 0 to 2 foot interval above the water table.
- At least one soil sample will be collected from an interval having the greatest PID field measurement, carbon disulfide dräger tube concentration or where visual observation indicates contamination.
- If these locations are the same, only one sample per test pit will be collected.

2.3.2 Sample Analysis

The analytical parameters and methodology for the drainage ditch delineation is included in Table 3.

2.4 Sump Area Delineation

2.4.1 Sample Location and Frequency

The objective of the soil sampling in the area of the sump (TP-24 through TP-27) is to evaluate the presence, extent and degree of soil contamination particularly carbon disulfide. The soil sampling locations will be located within a 25 foot radius of previous sampling locations exceeding 10 ppm of carbon disulfide. A total of four sampling locations will be sampled (Drawing 2).

Test pits will be excavated to a maximum depth of seven feet. The width of each test pit will be two feet (width of backhoe bucket). No excavation will be performed within two feet of utilities.

Soil samples will be collected from all 4 test pit locations (1 to 2 samples per test pit) as follows:

- At least one soil sample will be collected from the 0 to 2 foot interval above the water table.
- At least one soil sample will be collected from an interval having the greatest PID field measurement, carbon disulfide dräger tube concentration or where visual observation indicates contamination.
- If these locations are the same, only one sample per test pit will be collected.

2.4.2 Sample Analysis

The analytical parameters and methodology for the sump area delineation is included in Table 4.

2.5 Site Security and Fire Protection

Site security measures will be implemented prior to the field investigation. Site security will consist of a chain-link fence placed parallel to the drainage ditch north towards I-495 (Drawing 3). Permission will be obtained from the railroad prior to installation.

The fence will be six feet high with barbed wire and two man gates. Warning signs will be posted along every 50 feet of fence. The signs will state "Danger, Environmental Hazard, Unauthorized Personnel, Keep Out".

Fire protection will consist of a water spray or fog. The onsite contractor will provide fire protection during all field activities. A water hose and water spray nozzle and fire extinguishers are stored in the onsite trailer. In the event of a fire, the appropriate emergency action will be taken, including contacting the fire department and

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implementing fire protection and other protective action, as necessary. Fire control water will be contained to prevent the spread of contaminated water.

3.0 FIELD SAMPLING PROCEDURES

Specific procedures for field sampling are summarized below. Sampling procedures will be in accordance with the Compendium of Superfund Field Operations Methods (USEPA, 1987) or American Society for Testing Materials (ASTM) Standard Operating Procedures (SOP), included in Attachment C of the QAPP. Additional SOPs to be adhered to are provided by Conrail and included in Attachment C.

3.1 Test Pits

Test pits will be excavated by use of a track- or wheel-mounted excavator capable of a minimum excavation depth of 12 feet.

The following procedures apply to excavating and sampling test pit excavations:

- A standard test pit excavation log will be used to log soil and waste samples and record other pertinent information. A copy of a typical log is included as Figure 2.
- Samples will be taken at appropriate intervals and expeditiously examined and classified by the sampling team.
- Following classification, the soil samples to be sent for analysis will be placed in jars.
- Samples will be labeled with the project number, test pit number, depth, date, time and sample number.

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3.2 Handling of Excavated Materials

Soils from excavation activities from these 27 test pits will be temporarily staged within the area of contamination and subsequently redeposited into the same excavated area. Soils will be segregated into "clean" and obviously contaminated piles. The obviously contaminated soils will be redeposited in the excavated area first and the "clean" soils placed on top, or vice versa if contaminated soils are near the surface.

3.3 Sampling Procedures

Proper procedures will be followed during sample collection to ensure the validity and usability of the resultant data.

3.3.1 Soil Sampling Procedures

The soil samples will be collected using laboratory-cleaned stainless steel spatulas. Sample locations will be screened with a PID, a Combustible Gas Indicator (CGI), and dräger tubes (for carbon disulfide and hydrogen sulfide) for health and safety purposes. The samples will be directly transferred to the laboratory-provided sample containers except Quality Control (QC) samples (specifically the Matrix Spike and Matrix Spike/Laboratory Duplicate) which will be field homogenized in stainless steel mixing bowls prior to placement in the sample containers with the exception of the volatile organic portion, as discussed in subsection 3.4. The samples will be stored in a clean cooler and kept away from potential sources of contamination. Care will be taken to properly label all sample bottles.

3.3.2 Groundwater Sampling Procedures

The groundwater samples will be collected using a laboratory-cleaned six foot length teflon dipper. The sample will be directly transferred to the laboratory-provided sample containers. The samples will be stored in a cooler and kept

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away from potential sources of contamination. Care will be taken to properly label all sample bottles.

3.3.3 General Procedures

The sample designation and a description of the location and depth of sample will be recorded on the Chain-of-Custody Record/Analysis Request form and in the field log book. Following sample collection, all bottles will be placed in the cooler, maintained at approximately 4°C, and transferred under chain-of-custody procedures. Samples will be picked up at the site by the designated laboratory courier or sent by a common carrier (e.g., Federal Express).

3.4 Field Quality Control Samples

The sample locations will be screened with a PID, a CGI, and dräger tubes (for carbon disulfide and hydrogen sulfide) for health and safety monitoring purposes. The equipment will be maintained by the Contractor according to manufacturers specifications. Samples will be placed directly into sample containers. All soil samples will be homogenized by the laboratory, as part of the method procedures. In addition, the sampling team will field homogenize the Matrix Spike and Matrix Spike Duplicate/Laboratory Duplicate samples in dedicated decontaminated stainless steel containers prior to filling MS/MSD sample containers, with the exception of the volatile organic portion. Care will be taken to properly label all sample containers. The sample designation, a description of the location and the depth of sample will be recorded in the field book.

In addition, sample labels, custody seals, and Chain-of-Custody Record/Analysis Request forms will be completed. Field audit forms will be prepared during the sampling by the Health and Safety Officer (Attachment A). Field books, when not in use, are maintained in the project files. Copies of the Chain-of-Custody Record/Analysis Request forms and field audit forms are also maintained in the project files. The field investigation will be conducted in accordance with the Health and Safety Plan (HASP) and the Quality Assurance Project Plan (QAPP).

AR305032

To meet the Data Quality Objectives (DQO) of useability, the analytical detection limits must be applied to the samples and the following QC samples must be collected:

- one Matrix Spike (MS)/Matrix Spike Duplicate (MSD) and laboratory duplicate for every sample delivery group (twenty samples);
- one field duplicate for every ten samples;
- one USEPA split sample for every ten samples;
- one equipment rinsate blank will be collected each sample collection day;
- one field blank will be collected each sample collection day; and
- one trip blank will be collected each sample collection day.

For the collection of QC Samples, the following field practices will be observed. At a minimum, one out of every twenty sample locations will be designated as a MS and MSD and Laboratory Duplicate Sample.

Field duplicate samples will also be collected as outlined above but with a one out of ten frequency. Field duplicates will be labeled as sequential samples such that they will be treated as a laboratory blind duplicate.

Samples which are to be split with USEPA Region III are to be collected in the same manner and with the same frequency as field duplicate samples. These split samples will be given identical labels and sample numbers. Custody of one sample out of each pair of split samples will be transferred to USEPA Region III personnel.

Field homogenization of all MS/MSD and laboratory duplicate samples, with the exception of the volatile organic portion, will be done in stainless steel, laboratory decontaminated bowls. The volatile organic portion of the sample will be placed directly into 4 ounce jars.

Field blanks will be collected on each day of sampling. Additionally, equipment rinsate blanks will be collected from a sampling device (trowel, bowl, etc.) used on a given day. All aqueous samples or blanks requiring chemical preservatives will have

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those preservatives added to the empty sample containers by the laboratory before delivery to the field.

Trip blanks will be prepared by the laboratory and submitted by the Contractor for analysis on each day of sampling. All samples for volatile organic analyses will be placed in one cooler, thus one trip blank per day will be sufficient. If additional coolers for volatiles are necessary, additional trip blanks will be submitted (i.e., one trip blank per cooler containing samples for volatile organic analyses).

3.5 Sample Labeling Procedures

Samples will be identified with a two-part sample number as follows:

- An alphanumeric designation will be used to identify sample locations. For example, TP-1 denotes a sample location of test pit #1.
- Each sample will be numbered consecutively as the sample is taken. For example, 003 denotes the third sample collected from the site.

An example of a sample number is: TP-1-003, this designates the sample location as Test Pit 1, and it is the third sample taken at the site.

QC samples are collected from additional volumes of regular samples; therefore, the designation is the same with the addition of MS (Matrix Spike) or MSD (Matrix Spike Duplicate), i.e., TP-1-003-MS. Blank samples will be indicated with the next consecutive numeric designation as shown below:

- Trip Blank - TB-004;
- Field Blank - FB-005; and
- Equipment Rinsate Blank - ERB-006.

Information about: the location, sample number, date, time, depth, matrix and analysis required for each sample will be recorded in a bound field notebook. The chain-of-

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custody record will also indicate the number, location, depth, date, time, matrix, preservative, and other relevant information. All sampling information will be recorded in the field log book, including identification of blind duplicate samples. Blind field duplicate samples will only receive a numeric designation; i.e., 007, on the sample label and chain of custody record.

All samples will have the sample number and date of sampling on permanent self-adhesive labels attached to each container. An example of a sample container label is shown on Figure 3.

3.6 Sampling Containers, Preservation, and Holding Times

The analytical laboratory will provide all sample containers, preservatives, trip blanks, and sample shuttles for compliance with the USEPA test methods. Sample containers made of glass or plastic and of varying sizes will be supplied by the laboratory with required preservatives already added in compliance with the requirements of the USEPA Contract Lab Program (CLP) Statement of Work (SOW) or other methods as appropriate. Requirements are summarized in Table 5.

Samples will be shipped daily following collection by laboratory courier or by overnight mail to the contract laboratory for receipt the same day or the next day following sample collection.

All sample material, sample containers, and laboratory personal protective equipment will be disposed by the contract laboratory in a manner which meets all local, state, and federal requirements and in accordance with an approved contract laboratory QA Plan.

The integrity of the samples will be maintained throughout the sampling process; collection, packaging, shipment, and analysis. All samples will be preserved immediately after collection by sealing the containers and maintaining them at a low temperature with the utilization of ice or an ice substitute and sample shuttles.

3.7 Packaging and Shipping

Packaging and shipping of samples will be conducted as follows:

- Ice or an ice substitute will be placed in the cooler such that all samples are maintained at approximately 4°C.
- Styrofoam beads, cardboard or vermiculite, or other appropriate means will be employed to avoid sample breakage during transport.
- Chain of Custody Records (COCR) and other shipping/sample documentation will be placed in a waterproof plastic bag and attached to the underside of the lid of the sample shuttle.
- The shuttle will be closed and sealed with tape and custody seals in such a manner that the custody seals will be broken if the shuttle is opened (i.e., the clear tape will be placed over the seals, completely encircling the cooler). An example of a custody seal is shown on Figure 4.
- Return address labels will be attached to the inside and outside of the sample shuttle.
- The sides of the shuttle will be marked so as to indicate its proper vertical orientation.
- Shuttles will be sent to the analytical laboratory within 24 hours of collection.

3.8 Chain of Custody Record Procedures

Chain-of-Custody Record/Analysis Request forms (Figure 5) will be completed prior to sample shipment and will identify the samples collected, the date and time of collection, the number of bottles filled, the requested analyses, and the sampling team members.

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QC samples will be clearly identified by the MS and MSD notation. Field duplicate samples will be given routine, unique sample numbers which will not indicate their duplicate nature to the laboratory.

Any chemical preservatives used will be noted on the Chain-of-Custody Record/Analysis Request form.

Sample custody is an integral part of any laboratory or field operation. Sample custody procedures are designed to provide documentation of the preparation, handling, storage, shipment, and receipt of samples. Preservatives will be added to empty jars, as necessary, by the laboratory prior to delivery to the field sampling team. Accountability for samples collected during this field investigation will be the responsibility of the Contractor field personnel from the time samples are collected to the time when they are relinquished to the laboratory. The Contractor will prearrange to have samples relinquished to the laboratory courier for transfer to the laboratory or will send the samples by common carrier for overnight delivery. Stringent chain-of-custody procedures will be adhered to at all times. All sample identifications and chain-of-custody entries will be cross checked and verified before samples are either received or relinquished by any party. Each time the sample is transferred to another custodian, the parties relinquishing and receiving the sample will sign and date the record at the time of transfer.

The sampling staff is responsible for the care and custody of the samples until they are delivered to the laboratory courier. The sample containers used for shipment will be sealed onsite by the field sampling team using strapping tape and chain-of-custody seals. Sample bottles will be kept in the shipping containers except when they are being filled. Sample shipping and handling procedures will be in compliance with the requirements of the CLP SOW. The original Chain-of-Custody Record/Analysis Request form will be dated and signed and included in the shipping container. The forms will be placed in a plastic bag and taped to the underside of the cooler lid.

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3.9 Field Logbook Procedures

Field logbooks will be maintained in accordance with this plan. Records of samples collected, data measurements taken, and observations of events and conditions which could affect data quality will be recorded in the logbooks. These notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the data collection process, help qualify data, and refresh the memory of field personnel.

All original data collected in the field will be considered permanent records and will be recorded in field notebooks, data forms, sample identification tags, chain of custody records and other data forms in waterproof ink. All of these documents will be authenticated by the signature and date of the originator.

Errors will be corrected by crossing a single line through the error and entering the correct information. Pages will not be removed from the logbook. Corrections will be initialed and dated by the person making the correction.

Other information to be entered into the log book includes, but is not limited to, the following:

- The time entering and leaving the site as well as that of anyone else that is involved in the project (i.e., contractors, clients, etc.);
- Any significant occurrences such as wrong equipment, breakdowns, outcome of meetings, progress made onsite, evidence of contamination, etc.;
- Weather conditions (weather conditions are particularly important with respect to air sampling);
- Any deviation from the sampling plan and why;

AR305038

- How samples are to be delivered to the lab (i.e., hand delivered, pick-up, commercial carriers). If a commercial carrier is to be used, the air bill numbers will be recorded;
- Sample collection procedures such as containers (size, source), equipment used, preservation, blanks, duplicates, matrix, depth, time, location, identification numbers and parameters being analyzed for. If a sample is a composite, the % of the composite from each location will be described;
- Name, address, and contact of lab providing analytical services; and
- Decontamination and/or disposal arrangements for sampling equipment, samples and protective clothing as appropriate.

The person starting the logbook will fill out the information requested in the notebook (project name, project number, date issued, and whose custody the logbook is in). This book will be used until:

- the project is complete, or
- the logbook has been entirely used up and a new logbook must be started.

At this time, the logbook will be placed in the project file, and the requested information entered in the notebook (completion date, final disposition of logbook and person completing the logbook).

3.10 Decontamination Procedures

The sampling equipment will be decontaminated in the laboratory prior to sampling in accordance with the following procedures:

1. immersed in a solution of non-phosphate detergent and tap water;
2. scrubbed with a brush to remove any adhering particles;

AR305039

3. thoroughly rinsed with tap water;
4. rinsed with a 10 percent nitric acid solution;
5. rinsed with distilled-deionized water;
6. rinsed with methanol;
7. allowed to air dry;
8. rinsed with distilled-deionized water;
9. placed on a clean polyethylene sheet and allowed to air dry; and
10. wrapped in aluminum foil until used.

Enough laboratory-decontaminated stainless steel trowels and stainless steel mixing bowls will be brought to the field to be used for dedicated sampling. An excess supply of sampling equipment will be brought to the site to allow for any unforeseen sampling events. No field decontamination of sampling equipment is anticipated. As a result, there will be no waste decontamination fluids for sampling equipment to collect.

Gross contamination on sampling equipment will be physically removed in the field. The equipment will then be bagged in plastic prior to returning the equipment to the laboratory.

For decontamination of personal protective equipment (i.e., boots), two pans will be set up. One pan will contain soap and tap water for washing, and the second pan will contain tap water for rinsing.

For large pieces of equipment, such as backhoe buckets and drilling apparatus, steam cleaning with potable water may be used in place of the procedures listed above.

3.11 Waste Handling Procedures

During all phases of the field investigation, proper procedures will be followed in managing any wastes which are suspected or are known to be contaminated. These wastes will include decontamination solutions and disposable personal protective supplies.

AR305040

ORIGINAL
(1 of 1)

It is not anticipated that field decontamination of sampling equipment will be necessary; however, fluids generated from the field decontamination of sampling equipment will be transferred to and stored in 55-gallon drums or a storage tank(s). Any solids generated during decontamination procedures will be placed in plastic bags or 55-gallon drums for storage.

Decontamination fluids (soapy water and tap water) from personal protective equipment (i.e., boots) will be disposed of in the test pit area which was sampled.

Backhoe buckets will be steam cleaned after each excavation in the test pit area which was previously sampled so that decontamination fluids will infiltrate back into the surface in the same area which was excavated. This will be done after environmental samples are collected.

All wastes will be managed in accordance with 40 CFR 300.400, subparagraph E and will be placed into appropriate receptacles and labeled. Labels will contain information with regard to the type and source of waste, generator, and date of collection.

The drummed disposable supplies will be disposed of according to its hazard.

Any health and safety related waste (i.e., disposable gloves, boots) will be bagged and removed from the site for disposal.

TABLES

(Rev)



AR305042

ORIGINAL
(30-0)

TABLE 1
ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
WATER MAIN INVESTIGATION-FIRST EVENT⁽¹⁰⁾.

HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

<u>Parameter</u>	<u>Method</u>	<u>Number of Samples</u>
Soil Sample Analysis - 7 day Turnaround Time		
CLP VOC	SOW OLM01.8	12 to 18
CLP SVOC	SOW OLM01.8	12 to 18
CLP Pest/PCB	SOW OLM01.8	12 to 18
CLP Metals	SOW ILM03.0	12 to 18
CLP Cyanide	SOW ILM03.0	12 to 18
Thiocyanate	ASTM D4193-89	12 to 18
	ASTM D3987-85(Extraction method)	
Weak acid dissociable CN	SM 18th Ed. 4500-CN I.	12 to 18
Zero Headspace TCLP Extraction	SW846 Method 1311	6
Non-volatile TCLP Extraction	SW846 Method 1311	6
TCLP VOC	SW846 Method 8240A	6
TCLP SVOC	SW846 Method 8270A	6
TCLP Metals	SW846 Method	6
	6010A/7471A	
TCLP Pesticides	SW846 Method 8080A	6
TCLP Herbicides	SW846 Method 8150B	6
Ignitability	SW846 Method 1020B	12 to 18
Corrosivity	SW846 Method 9045C	12 to 18
Cyanide Reactivity	SW846 Section 7.3.3.2	12 to 18
Sulfide Reactivity	SW846 Section 7.3.4.2	12 to 18
pH	SW846 Method 9045C ⁽¹⁾ and SOW OLM01.8	12 to 18
Air Sample Analysis - 48 - 72 hour Turnaround Time		
Hexavalent Chromium	NIOSH Method 7600	none collected
Arsenic	NIOSH Method 7300	note ⁽²⁾
Chromium	NIOSH Method 7300	note ⁽²⁾
Lead	NIOSH Method 7300	note ⁽²⁾
Cassette Cartridge		
Filter medium (Cellulose Acetate or PVC)		

AR305043

TABLE 1--continued

**ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
WATER MAIN INVESTIGATION - FIRST EVENT⁽¹⁰⁾**

**HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE**

Quality Control Samples

<u>Type</u>	<u>Parameters</u>	<u>Number of Samples</u>
Soil Sampling - 7 day Turnaround Time		
MS ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1 to 2 ⁽³⁾
MSD/Laboratory Duplicate ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1 to 2 ⁽³⁾
Field Duplicate ⁽⁶⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	2
USEPA Split ⁽⁷⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN TCLP, RCRA Characteristics	none collected
Equipment Rinsate Blank ⁽⁹⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Field Blank ⁽⁹⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Trip Blank ⁽⁸⁾⁽⁹⁾	VOC	note ⁽⁴⁾

Air Sampling - 48-72 hour Turnaround Time

Reagent Blank	Arsenic, Chromium, Lead	note ⁽¹¹⁾
Matrix Blank	Arsenic, Chromium, Lead	note ⁽¹¹⁾
Blank Spike	Arsenic, Chromium, Lead	note ⁽¹¹⁾
Matrix Blank Spike	Arsenic, Chromium, Lead	note ⁽¹¹⁾
Matrix Blank Spike Duplicate	Arsenic, Chromium, Lead	note ⁽¹¹⁾
Laboratory Control Sample	Arsenic, Chromium, Lead	note ⁽¹¹⁾

⁽¹⁾ pH for aqueous samples analyzed by SW846 Method 9040B.

⁽²⁾ Two samples per day.

⁽³⁾ One MS/MSD sample will be collected per sample delivery group (20 samples).

⁽⁴⁾ One sample per day will be collected.

⁽⁵⁾ Triple the nominal volume of a specific sample will be collected for MS and MSD/Laboratory Duplicates.

⁽⁶⁾ Double the nominal volume of a specific sample will be collected for Field Duplicates.

⁽⁷⁾ USEPA splits performed at EPA's discretion.

⁽⁸⁾ All samples for volatile organic analyses will be placed in one cooler per day. In the event that a second cooler is needed for volatile organic analyses, then a second trip blank will be included.

⁽⁹⁾ ASTM Type 2 water will be used for preparation of QC blank samples.

⁽¹⁰⁾ This investigation was completed on 29 August 1995. Wherever 12-18 samples were specified, 12 samples were collected.

⁽¹¹⁾ QC samples for air sampling are analyzed at a rate of 1 per 20 samples.

MS - Matrix Spike

MSD - Matrix Spike Duplicate

VOC-CLP Volatile Organic Compounds

SVOC-CLP Semi Volatile Organic Compounds

Pest/PCB-CLP Pesticides and Polynuclear Chlorinated Biphenyls

Metals-CLP Metals

Cyanide-CLP Cyanide

CN - Weak Acid Dissociable CN

AR305044

TABLE 2

**ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
WATER MAIN INVESTIGATION - SECOND EVENT**

**HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE**

<u>Parameter</u>	<u>Method</u>	<u>Number of Samples</u>
Soil Sample Analysis - 14 day Turnaround Time		
CLP VOC	DNREC HSCA SOP/SOW OLM03.1	12 to 18
CLP SVOC	SOW OLM03.1	12 to 18
CLP Pest/PCB	SOW OLM03.1	12 to 18
CLP Metals	SOW ILM03.0	12 to 18
CLP Cyanide	SOW ILM03.0	12 to 18
Thiocyanate	ASTM D4193-89	12 to 18
	ASTM D3987-85 (Extraction Method)	
Weak acid dissociable CN	SM 18th Ed. 4500-CN I.	12 to 18
Zero Headspace TCLP Extraction	SW846 Method 1311	6
Non-volatile TCLP Extraction	SW846 Method 1311	6
TCLP VOC	SW846 Method 8240A	6
TCLP SVOC	SW846 Method 8270A	6
TCLP Metals	SW846 Method 6010A/7471A	6
TCLP Pesticides	SW846 Method 8080A	6
TCLP Herbicides	SW846 Method 8150B	6
Ignitability	SW846 Method 1020B	12 to 18
Corrosivity	SW846 Method 9045C	12 to 18
Cyanide Reactivity	SW846 Section 7.3.3.2	12 to 18
Sulfide Reactivity	SW846 Section 7.3.4.2	12 to 18
pH	SW846 Method 9045C ⁽¹⁾	12 to 18
Groundwater Sample Analysis		
CLP VOC	SOW OLM03.1	1
CLP SVOC	SOW OLM03.1	1
CLP Pest/PCB	SOW OLM03.1	1
CLP Metals	SOW ILM03.0	1
CLP Cyanide	SOW ILM03.0	1
Thiocyanate	ASTM D4193-89	1
Weak acid dissociable CN	SM 18th Ed. 4500-CN I.	1
Air Sample Analysis - 48 - 72 hour Turnaround Time		
Hexavalent Chromium	NIOSH Method 7600	note ⁽²⁾
Arsenic	NIOSH Method 7300	note ⁽²⁾
Chromium	NIOSH Method 7300	note ⁽²⁾
Lead	NIOSH Method 7300	note ⁽²⁾
Cassette Cartridge		
Filter medium (Cellulose Acetate or PVC)		

AR305045

TABLE 2--continued

ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
WATER MAIN INVESTIGATION - SECOND EVENTHALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

Quality Control Samples

Soil Sampling - 14 day Turnaround Time

<u>Type</u>	<u>Parameters</u>	<u>Number of Samples</u>
MS ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1-2 ⁽³⁾
MSD/Laboratory Duplicate ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1-2 ⁽³⁾
Field Duplicate ⁽⁶⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	2
USEPA Split ⁽⁷⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	2
Equipment Rinsate Blank ⁽⁹⁾	TCLP, RCRA Characteristics VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Field Blank ⁽⁹⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Trip Blank ⁽⁸⁾⁽⁹⁾	VOC	note ⁽⁴⁾

Air Sampling - 48-72 hour Turnaround Time

Reagent Blank	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Blank Spike	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank Spike	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank Spike Duplicate	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Laboratory Control Sample	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾

(1) pH for aqueous samples analyzed by SW846 Method 9040B.

(2) Two samples per day

(3) One MS/MSD sample will be collected per sample delivery group (20 samples)

(4) One sample per day will be collected

(5) Triple the nominal volume of a specific sample will be collected for MS and MSD/Laboratory Duplicates.

(6) Double the nominal volume of a specific sample will be collected for Field Duplicates.

(7) USEPA splits performed at EPA's discretion.

(8) All samples for volatile organic analyses will be placed in one cooler per day. In the event that a second cooler is needed for volatile organic analyses, then a second trip blank will be included.

(9) ASTM Type 2 water will be used for preparation of QC blank samples.

(11) QC samples for air sampling are analyzed at a rate of 1 per 20 samples.

MS - Matrix Spike

MSD - Matrix Spike Duplicate

VOC-CLP Volatile Organic Compounds

SVOC-CLP Semi Volatile Organic Compounds

Pest/PCB-CLP Pesticides and Polynuclear Chlorinated Biphenyls

Metals-CLP Metals

Cyanide- CLP Cyanide

CN - Weak Acid Dissociable CN

AR305046

TABLE 3

ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
DRAINAGE DITCH DELINEATIONHALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

<u>Parameter</u>	<u>Method</u>	<u>Number of Samples</u>
Soil Sample Analysis - 14 day Turnaround Time		
CLP VOC	DNREC HSCA SOP/SOW OLM03.1	17 TO 34
CLP SVOC	SOW OLM03.1	17 TO 34
CLP Pest/PCB	SOW OLM03.1	17 TO 34
CLP Metals	SOW ILM03.0	17 TO 34
CLP Cyanide	SOW ILM03.0	17 TO 34
Thiocyanate	ASTM D4193-89	17 TO 34
	ASTM D3987-85 (Extraction Method)	
Weak acid dissociable CN	SM 18th Ed. 4500-CN I.	17 TO 34
Zero Headspace TCLP Extraction	SW846 Method 1311	17
Non-volatile TCLP Extraction	SW846 Method 1311	17
TCLP VOC	SW846 Method 8240A	17
TCLP SVOC	SW846 Method 8270A	17
TCLP Metals	SW846 Method 6010A/7471A	17
TCLP Pesticides	SW846 Method 8080A	17
TCLP Herbicides	SW846 Method 8150B	17
Ignitability	SW846 Method 1020B	17 TO 34
Corrosivity	SW846 Method 9045C	17 TO 34
Cyanide Reactivity	SW846 Section 7.3.3.2	17 TO 34
Sulfide Reactivity	SW846 Section 7.3.4.2	17 TO 34
pH	SW846 Method 9045C ⁽¹⁾	17 TO 34
Air Sample Analysis - 48 - 72 hour Turnaround Time		
Hexavalent Chromium	NIOSH Method 7600	note ⁽²⁾
Arsenic	NIOSH Method 7300	note ⁽²⁾
Chromium	NIOSH Method 7300	note ⁽²⁾
Lead	NIOSH Method 7300	note ⁽²⁾
Cassette Cartridge		
Filter medium (Cellulose Acetate or PVC)		

AR305047

TABLE 3--continued

ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
DRAINAGE DITCH DELINEATIONHALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

Quality Control Samples

Soil Sampling - 14 day Turnaround Time

Type	Parameters	Number of Samples
MS ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	2 to 3 ⁽³⁾
MSD/Laboratory Duplicate ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	2 to 3 ⁽³⁾
Field Duplicate ⁽⁶⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	4
USEPA Split ⁽⁷⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	4
Equipment Rinsate Blank ⁽⁹⁾	TCLP, RCRA Characteristics VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Field Blank ⁽⁹⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Trip Blank ⁽⁸⁾⁽⁹⁾	VOC	note ⁽⁴⁾

Air Sampling - 48-72 hour Turnaround Time

Reagent Blank	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Blank Spike	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank Spike	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank Spike Duplicate	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Laboratory Control Sample	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾

(1) pH for aqueous samples analyzed by SW846 Method 9040B

(2) Two samples per day

(3) One MS/MSD sample will be collected per sample delivery group (20 samples)

(4) One sample per day will be collected

(5) Triple the nominal volume of a specific sample will be collected for MS and MSD/Laboratory Duplicates.

(6) Double the nominal volume of a specific sample will be collected for Field Duplicates.

(7) USEPA splits performed at EPA's discretion.

(8) All samples for volatile organic analyses will be placed in one cooler per day. In the event that a second cooler is needed for volatile organic analyses, then a second trip blank will be included.

(9) ASTM Type 2 water will be used for preparation of QC blank samples.

(11) QC samples for air sampling are analyzed at a rate of 1 per 20 samples.

MS - Matrix Spike

MSD - Matrix Spike Duplicate

VOC-CLP Volatile Organic Compounds

SVOC-CLP Semi Volatile Organic Compounds

Pest/PCB-CLP Pesticides and Polynuclear Chlorinated Biphenyls

Metals-CLP Metals

Cyanide-CLP Cyanide

CN - Weak Acid Dissociable CN

AR305048

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(R6)

TABLE 4
ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
SUMP AREA DELINEATION

HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

<u>Parameter</u>	<u>Method</u>	<u>Number of Samples</u>
Soil Sample Analysis - 14 day Turnaround Time		
CLP VOC	DNREC HSCA SOP/SOW OLM03.1	4 to 8
CLP SVOC	SOW OLM03.1	4 to 8
CLP Pest/PCB	SOW OLM03.1	4 to 8
CLP Metals	SOW ILM03.0	4 to 8
CLP Cyanide	SOW ILM03.0	4 to 8
Thiocyanate	ASTM D4193-89	4 to 8
Weak acid dissociable CN	ASTM D3987-85 (Extraction Method) SM 18th Ed. 4500-CN I.	4 to 8
Zero Headspace TCLP Extraction	SW846 Method 1311	4
Non-volatile TCLP Extraction	SW846 Method 1311	4
TCLP VOC	SW846 Method 8240A	4
TCLP SVOC	SW846 Method 8270A	4
TCLP Metals	SW846 Method 6010A/7471A	4
TCLP Pesticides	SW846 Method 8080A	4
TCLP Herbicides	SW846 Method 8150B	4
Ignitability	SW846 Method 1020B	4 to 8
Corrosivity	SW846 Method 9045C	4 to 8
Cyanide Reactivity	SW846 Section 7.3.3.2	4 to 8
Sulfide Reactivity	SW846 Section 7.3.4.2	4 to 8
pH	SW846 Method 9045C ⁽¹⁾	4 to 8
Air Sample Analysis - 48 - 72 hour Turnaround Time		
Hexavalent Chromium	NIOSH Method 7600	note ⁽²⁾
Arsenic	NIOSH Method 7300	note ⁽²⁾
Chromium	NIOSH Method 7300	note ⁽²⁾
Lead	NIOSH Method 7300	note ⁽²⁾
Cassette Cartridge		
Filter medium (Cellulose Acetate or PVC)		

AR305049

TABLE 4--continued

ANALYTICAL PARAMETERS AND METHODOLOGY SUMMARY
SUMP AREA DELINEATIONHALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

Quality Control Samples

Soil Sampling - 14 day Turnaround Time

<u>Type</u>	<u>Parameters</u>	<u>Number of Samples</u>
MS ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1 to 2 ⁽³⁾
MSD/Laboratory Duplicate ⁽⁵⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1 to 2 ⁽³⁾
Field Duplicate ⁽⁶⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1
USEPA Split ⁽⁷⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	1
Equipment Rinsate Blank ⁽⁹⁾	TCLP, RCRA Characteristics VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Field Blank ⁽⁹⁾	VOC, SVOC, Pest/PCB, Metals, Cyanide Thiocyanate, CN	note ⁽⁴⁾
Trip Blank ⁽⁸⁾⁽⁹⁾	VOC	note ⁽⁴⁾

Air Sampling - 48-72 hour Turnaround Time

Reagent Blank	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Blank Spike	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank Spike	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Matrix Blank Spike Duplicate	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾
Laboratory Control Sample	Hexavalent Chromium, Arsenic, Chromium, & Lead	note ⁽¹¹⁾

(1) pH for aqueous samples analyzed by SW846 Method 9040B.

(2) Two samples per day

(3) One MS/MSD sample will be collected per sample delivery group (20 samples)

(4) One sample per day will be collected

(5) Triple the nominal volume of a specific sample will be collected for MS and MSD/Laboratory Duplicates.

(6) Double the nominal volume of a specific sample will be collected for Field Duplicates.

(7) USEPA splits performed at EPA's discretion.

(8) All samples for volatile organic analyses will be placed in one cooler per day. In the event that a second cooler is needed for volatile organic analyses, then a second trip blank will be included.

(9) ASTM Type 2 water will be used for preparation of QC blank samples.

(11) QC samples for air sampling are analyzed at a rate of 1 per 20 samples.

MS - Matrix Spike

MSD - Matrix Spike Duplicate

VOC-CLP Volatile Organic Compounds

SVOC-CLP Semi Volatile Organic Compounds

Pest/PCB-CLP Pesticides and Polynuclear Chlorinated Biphenyls

Metals-CLP Metals

Cyanide- CLP Cyanide

CN - Weak Acid Dissociable CN

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TABLE 5

PARAMETERS, SAMPLE CONTAINERS, SAMPLE VOLUMES,
PRESERVATION, AND HOLDING TIMES
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

SOIL SAMPLES

Parameter	Sample Container (1)	Container Volume	Container Number	Preservation (2)	Maximum Holding Time	Analytical Methodology
Volatile Organics	Aqueous-G, black phenolic plastic screw cap <u>lined septum</u> Nonaqueous-G, polypropylene cap, white teflon liner	Aqueous - 40 ml Nonaqueous 120 ml	2-3 1	Cool, 4 deg C, dark, 0.08% Na ₂ S ₂ O ₃ if residual Cl ₂	10 days	USEPA-CLP Statement of Work for Organic Analysis, Multi-Media, Multi Concentration (SOW OLM03.1)
Base Neutral/Acid Extractable (Semivolatile) Organics	Amber G, Teflon lined cap Nonaqueous-Glass bottle Nonaqueous - Flint Glass bottle, black phenolic cap, polyethylene liner	Aqueous 1000 ml Nonaqueous 16 oz	2 1	Cool, 4 deg C, dark	Extraction Aqueous continuous liquid-liquid extraction must be started within 5 days Non-aqueous - 10 days Analysis - 40 days	USEPA-CLP Statement of Work for Organic Analysis, Multi-Media, Multi Concentration (SOW OLM03.1)
Pesticide/PCB's	Amber G, Teflon lined cap Nonaqueous-Glass bottle Nonaqueous - Flint Glass bottle, black phenolic cap, polyethylene liner	Aqueous 1000 ml Nonaqueous 16 oz	2 note (b)	Cool, 4 deg C, dark	Extraction Aqueous continuous liquid-liquid extraction must be started within 5 days Non-aqueous - 10 days Analysis - 40 days	USEPA-CLP Statement of Work for Organic Analysis, Multi-Media, Multi Concentration (SOW OLM03.1)
Metals except Hg	Aqueous - P bottle, P cap P liner Nonaqueous - Flint Glass bottle, black phenolic cap, polyethylene liner	Aqueous - 1000 ml Nonaqueous 4, 8, 16, or 32 oz	1 note (b)	Aqueous - HNO ₃ to pH<2 Nonaqueous - 4 deg C until analysis	180 days 180 days	USEPA-CLP Statement of Work for Inorganic Analysis Multi Media, Multi Concentration (SOW ILM03.0)
Hg	Aqueous - P bottle, P cap P liner Nonaqueous - Flint Glass bottle, black phenolic cap, polyethylene liner	Aqueous - 1000 ml Nonaqueous 4, 8, 16, or 32 oz		Aqueous - HNO ₃ to pH<2 Nonaqueous - 4 deg C until analysis	26 days	USEPA-CLP Statement of Work for Inorganic Analysis Multi Media, Multi Concentration (SOW ILM03.0)

AR305051

USEPA
(10/2)

TABLE 5 - Contin.

PARAMETERS, SAMPLE CONTAINERS, SAMPLE VOLUMES,
PRESERVATION, AND HOLDING TIMES
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

SOIL SAMPLES

Parameter	Sample Container (1)	Container Volume	Container Number	Preservation (2)	Maximum Holding Time	Analytical Methodology
Cyanide	Aqueous - P bottle, P cap P liner Nonaqueous - Flint Glass bottle, black phenolic cap, polyethylene liner	Aqueous - 1000 ml Nonaqueous 4, 8, 16, or 32 oz	1 note (3)	Aqueous - 0.6g ascorbic acid if residual Cl ₂ , NaOH to pH>12, cool, 4 deg C until analyzed CaCO ₃ in presence of sulfide Nonaqueous Cool, 4 deg C, until analyzed	12 days	USEPA-CLP Statement of Work for Inorganic Analysis Multi Media, Multi Concentration (SOW ILM03.0)

Notes:

(1) P = Plastic; hard or soft
G = Glass

(2) Na₂S₂O₃ = Sodium thiosulfate
NaOH = Sodium hydroxide
Cl₂ = Chlorine
HNO₃ = Nitric Acid

(3) included in above 16 oz. glass jar

ORIGINAL
(Red)

AR305052

TABLE 5 - continued

PARAMETERS, SAMPLE CONTAINERS, SAMPLE VOLUMES,
PRESERVATION, AND HOLDING TIMES
HALBY CHEMICAL SUPERFUND SITE
WILMINGTON, DELAWARE

AIR SAMPLES

Parameter	Sample Container (1)	Container Volume	Container Number	Preservation (2)	Maximum Holding Time	Analytical Methodology
Arsenic	Cassette Cartridge (Cellulose Acetate)	10 mm diameter	1	None	None	NIOSH Method 7300
Chromium	Cassette Cartridge (Cellulose Acetate)	10 mm diameter	note ⁽⁴⁾	None	None	NIOSH Method 7300
Lead	Cassette Cartridge (Cellulose Acetate)	10 mm diameter	note ⁽⁴⁾	None	None	NIOSH Method 7300
Hexavalent Chromium	Cassette Cartridge (PVC)	10 mm diameter	1	None	2 weeks	NIOSH Method 7600
Carbon Disulfide	Dräger Tube	---	1	Store at Room Temperature	Two years (expiration date is on the box of tubes)	In accordance with the Dräger Detector Tube Handbook
Ammonia	Dräger Tube	---	1	Store at Room Temperature	Two years (expiration date is on the box of tubes)	In accordance with the Dräger Detector Tube Handbook
Hydrogen Sulfide	Dräger Tube	---	1	Store at Room Temperature	Two years (expiration date is on the box of tubes)	In accordance with the Dräger Detector Tube Handbook

⁽⁴⁾ Included in above cartridge mm-millimeter.

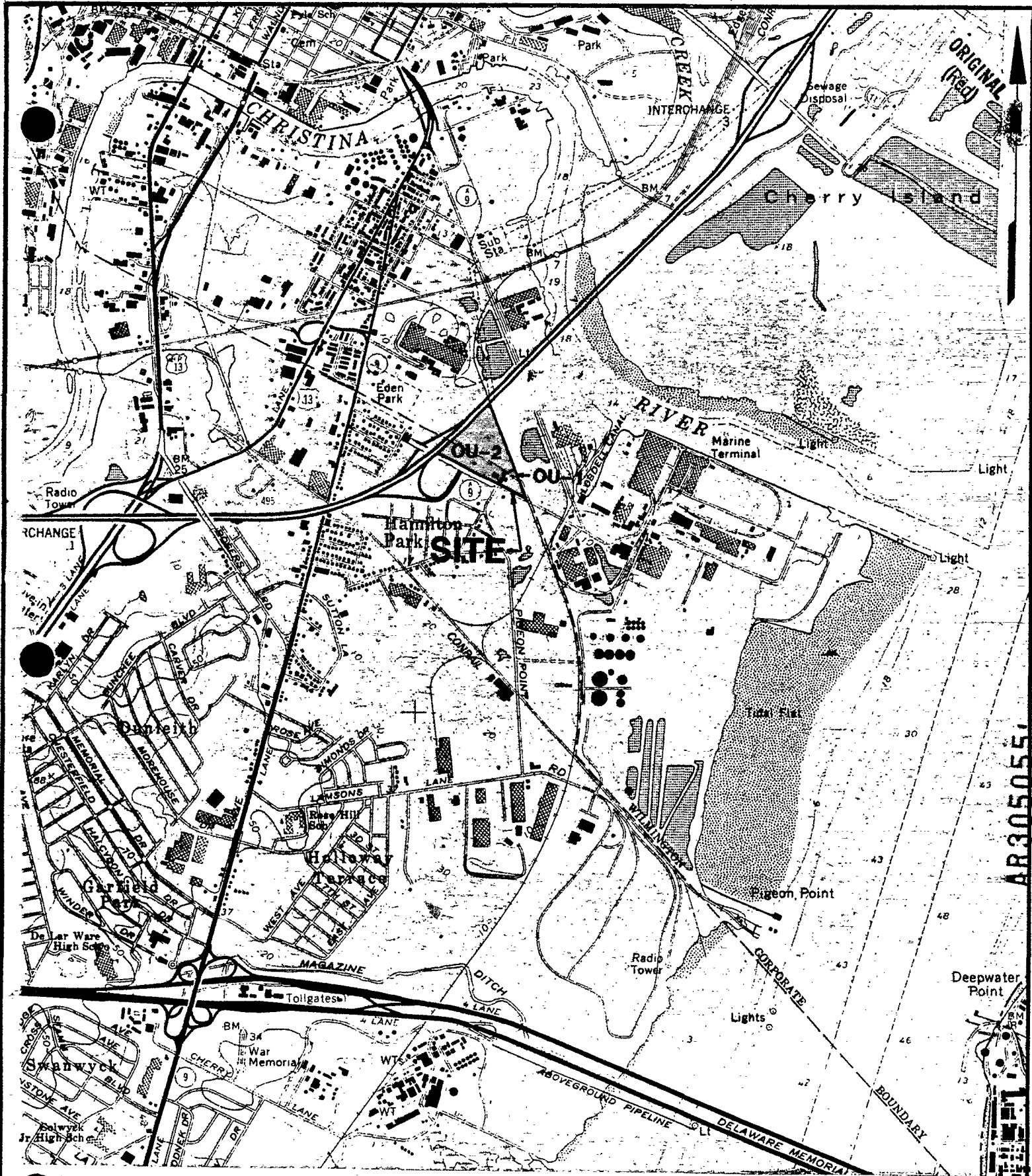
AR305053

ORIGINAL
(Red)

ORIGINAL
(Red)

FIGURES

AR305054



AR3050551

WILMINGTON SOUTH, DEL.-N.J. U.S.G.S. QUADRANGLE MAP, 1987

OU-1 OPERABLE UNIT 1
OU-2 OPERABLE UNIT 2

Langan
Engineering and Environmental Services, Inc.

HALBY CHEMICAL SITE SITE LOCATION MAP

WILMINGTON

DELAWARE

ELMWOOD PARK NJ - NEW YORK NY - MIAMI FL - WEST PALM BEACH FL - DOYLESTOWN PA

PROJ 2061601

SCALE 1"=2000'

DATE 8/1/95

FIG NO

1

PROJECT			PROJECT NO		
LOCATION			ELEVATION AND DATUM		
EXCAVATION CONTRACTOR			DATE		COMPLETION DEPTH
EXCAVATION EQUIPMENT			OBSERVED WATER LEVEL DATA		

ELEV.	DESCRIPTION	DEPTH SCALE	SAMPLE		REMARKS
			NO	TYPE	
		1			
		2			
		3			
		4			
		5			
		6			
		7			
		8			
		9			
		10			
		11			
		12			
		13			
		14			
		15			
		16			

AR305056

ORIGINAL
(Red)

ENVIROTECH RESEARCH 777 NEW DURHAM ROAD EDISON, NJ 08817 (908) 549-3900		
PROJECT NAME/CLIENT		
SAMPLE LOCATION/DESCRIPTION		
TEST PARAMETERS		
CONTAINER NO.		PRESERVATIVE
DATE	TIME	SAMPLER'S INITIALS

AR305057



Langan
Engineering and Environmental Services, Inc.

ELMWOOD PARK, NJ • NEW YORK, NY • MIAMI, FL • DOYLESTOWN, PA


**HALBY CHEMICAL SITE
SAMPLE CONTAINER LABEL**

WILMINGTON

DELAWARE

PROJ	2061601	SCALE	N.T.S.	DATE	29 AUG. 95	FIG NO	3
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ORIGINAL
(Red)

 Langan Engineering and Environmental Services	SAMPLE NO	DATE	SEAL BROKEN BY	DATE
	SIGNATURE			
	PRINT NAME AND TITLE (Inspector, Analyst or Technician)			

AR305058



Langan
Engineering and Environmental Services, Inc.

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**HALBY CHEMICAL SITE
CUSTODY SEAL**

WILMINGTON

DELAWARE

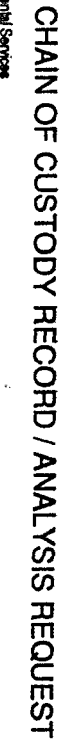
PROJ **2061601**

SCALE **N.T.S.**

DATE **29 AUG. 95**

FIG NO

4



CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

22

[illegible]

AR305059

ORIGINAL
(Red)

EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID # 100747
PAGE # 305060

IMAGERY COVER SHEET
UNSCANNABLE ITEM

Contact the CERCLA Records Center to view this document.

SITE NAME	<u>Halby Chemical</u>
OPERABLE UNIT	<u>00</u>
SECTION/BOX/FOLDER	<u>Administrative Record reading room</u>

REPORT OR DOCUMENT TITLE	<u>Response Action Plan</u>
DATE OF DOCUMENT	<u>11/20/95</u>
DESCRIPTION OF IMAGERY	<u>Topographic Map</u>
NUMBER AND TYPE OF IMAGERY ITEM(S)	<u>1 map</u>

EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID # 100747
PAGE # AR 305061

IMAGERY COVER SHEET
UNSCANNABLE ITEM

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SITE NAME Halby Chemical
OPERABLE UNIT 00
SECTION/BOX/FOLDER AR reading room

REPORT OR DOCUMENT TITLE Response Action Plan
DATE OF DOCUMENT 11/20/95
DESCRIPTION OF IMAGERY Existing and Proposed
Sampling Locations - Drawing No. 1
NUMBER AND TYPE OF IMAGERY ITEM(S) 1 map

EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID # 100747
PAGE # AR301062

IMAGERY COVER SHEET
UNSCANNABLE ITEM

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SITE NAME Halby Chemical
OPERABLE UNIT 00
SECTION/BOX/FOLDER AK reading room

REPORT OR DOCUMENT TITLE Response Action Plan
DATE OF DOCUMENT 11/20/95
DESCRIPTION OF IMAGERY Existing and Proposed
Sampling Locations - Drawing No. 2
NUMBER AND TYPE OF IMAGERY ITEM(S) 1 map

ORIGINAL
(Red)

AR305063

ORIGINAL
(Red)

ATTACHMENT A
FIELD AUDIT CHECKLIST

AR305064

FIELD AUDIT CHECKLIST

Project _____ Date _____ Time _____

Auditor(s) _____

On-site Sampling Personnel _____

Activity(ies) Audited _____

Soil Sampling

Soil Sampling Observations:

Proper sampling locations? _____

Sampling locations documented? _____

Sampling times documented? _____

Dedicated spoons/trowels used? _____

Sample bottles properly labeled? _____

Sampling proceeding from suspected least contaminated area to
most contaminated area? _____

Sample bottles filled to maximum extent possible? _____

Samples refrigerated/iced immediately after collection? _____

Proper depth of sample collection? _____

Log (grain size, color, etc.) of material complete and accurate, if
applicable? _____

Proper collection of QA samples employed? _____

Split-sample collection procedures being performed correctly? _____

Safety:

Proper level of protective clothing? _____

HASP available? _____

Monitoring equipment available? _____

Monitoring equipment properly calibrated? _____

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